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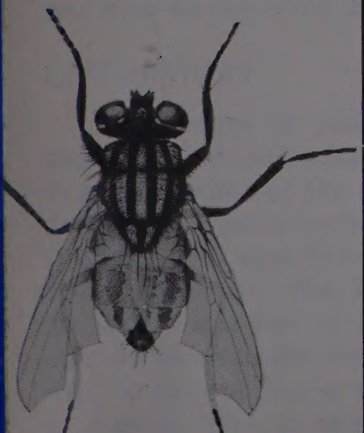
and their control

by C. R. TWINN



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FLIES AND THEIR CONTROL

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This publication deals with various species of flies that occur in dwellings and other buildings in Canada and includes a section on insecticides and how to apply them in fly control.

HOUSE FLY

Of the several species of two-winged flies found indoors, the house fly[1] (cover) is the most abundant and annoying. This species is about a quarter of an inch long and is dusky-gray in color. It may be distinguished from other house-infesting flies by the presence of four dark, longitudinal stripes on the thorax and by its mouth parts, which are pad-shaped at the tip and not fitted for piercing like those of the stable fly, which it closely resembles.

The house fly is world-wide in distribution and plays a part in the spread of such diseases as typhoid, infantile diarrhoea, cholera, and dysentery. It breeds in filth, such as various kinds of manure, human feces, and garbage. It is a menace to public health because of its habit of passing directly from filth to human food, carrying bacteria and other organisms and particles of decomposing organic matter on its hairy body and legs and sticky feet and mouth parts. Undesirable organisms may also be conveyed to food in its excreta and regurgitated saliva (fly-specks).

LIFE-HISTORY

The house fly passes through four life-stages, namely, egg, larva or maggot, pupa, and winged adult. The female fly deposits small, elongate, pearly-white eggs in batches of 100 to 150 in fresh manure, human feces, garbage, or other decomposing organic matter. One female may lay up to 1,000 or more eggs during her lifetime. The eggs hatch usually within 24 hours, the time varying with temperature conditions. The larvae are slender, creamy-white, headless, and legless maggots about half an inch long when full-grown. They may be seen as writhing masses close to the surface of the infested material. On reaching maturity, which may be in less than a week in warm weather, the larvae move to a suitable place to pupate. This is usually along the edges of manure piles, in the surrounding soil, or in the ashes and soil with which garbage dumps frequently are covered. The pupae are smooth, dark brown, somewhat barrel-shaped, and about a quarter of an inch long. In about a week, depending on temperature, the flies emerge and shortly commence egg-laying. Thus, in warm weather, the period from the time the

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[1] *Musca domestica* L.

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egg is laid until emergence of the winged fly may be less than two weeks. There may be five to eight generations of the house fly a year in southern Canada, the number depending on location and seasonal conditions. The flies, which may live for several weeks in a favorable environment, are most numerous in summer and early autumn, but their numbers diminish rapidly on the coming of cold weather.

CONTROL

Sanitation

The most effective and desirable method of control is to eliminate or reduce breeding places by treating or disposing of materials such as manure, other fecal matter, and garbage. Fresh horse manure is a prolific source of house flies in rural areas. In cities, where there are now few horses, garbage is an important source. To be effective, control measures against the breeding places should be organized on a community-wide basis as one neglected manure heap or garbage dump may infest a whole neighbourhood.

Treatment of Manure. - Stables, particularly those in urban areas, should be well constructed, the floors preferably being of concrete so laid as to allow good drainage and thorough cleansing. Keep the floors clean. Where it is not possible to remove the manure daily, store it temporarily in a fly-proof receptacle. This may be a large bin constructed of concrete with a raisable lid to allow the manure to be thrown in, and a hinged door in the front through which to remove it. In urban areas, remove and dispose of collections of manure at least twice a week during the summer. In rural areas, where practicable, remove the manure daily and spread it thinly in fields where the drying effect of sun and wind will prevent breeding. An alternate method consists of taking advantage of the heat produced by fermentation when manure is tightly packed. Construct the manure pile on hard ground or concrete to prevent the larvae from having access to soil in which to pupate. Keep the sides of the pile clean-cut and almost vertical, but sloping slightly toward the centre. As fresh manure is added, pack it tightly with a shovel. The heat produced by fermentation destroys eggs, larvae, and pupae, except those close to the surface. Destroy any stages of the fly in the top layer by spraying it with a solution of one pound of borax in six gallons of water. This is enough to treat 30 square feet; or spray the surface and surroundings with one per cent malathion in water.

As flies also breed in manure from other livestock no manure should be allowed to accumulate.

Treatment of Garbage. - Wrap organic refuse such as garbage in paper and store it in fly-proof containers until disposed of, preferably by burning. During the warm months of the year, municipal garbage dumps may produce enormous numbers of flies and harbor other vermin, and this and their obnoxious odors constitute a public nuisance. Covering dumps with soil or ashes, after the garbage has become infested with fly eggs and larvae, does not prevent the flies from emerging. The garbage should be burned in an incinerator.

Treatment of Human Excrement. - The problem of flies breeding in human excrement is largely confined to rural districts where open-box privies are common. Flies frequently swarm in large numbers about such places and are a menace to health as they may carry disease organisms from the fecal matter to human food, particularly milk. Screen privies adequately. Prevent flies from breeding in the excrement by liberally sprinkling it every three or four days with powdered borax.

Kill flies that enter the privy with a space spray or a residual spray.

Control in Dwellings

Exclude flies from houses and other buildings by screening doors and windows. Use screens with not less than 14 and preferably 16 meshes to the inch; the latter also excludes other insects much smaller than flies. Make screen doors fit well and open outward. Destroy flies that gain entrance with insecticides (see page 5), fly swatters, or adhesive fly papers.

STABLE FLY

The stable fly[2] resembles the house fly in size and appearance, but may be distinguished from it by its awl-like proboscis that projects forward from the lower part of the head. Both males and females are blood-suckers and attack livestock and man. They are often an annoying pest on bathing beaches. A favorite site for their bites in the larger hosts is the lower part of the legs. The flies may be noticed in summer resting in sunny places on the walls of farm buildings. Although they usually live outdoors they frequently enter animal quarters and homes, especially in dull or stormy weather. These flies will breed in excrement, especially horse manure when mixed with much hay and straw, but their favorite breeding place is rotting vegetation, such as old hay and straw stacks, decaying lawn clippings, and vegetation along lake and sea shores. The life-cycle from egg to adult requires about three weeks or more and there may be several generations during a season. The flies may live about three weeks, sometimes longer. They become increasingly numerous as the summer advances and are troublesome until the onset of cold weather.

CONTROL

The measures recommended against the house fly have value against the stable fly. Indoors, use a space spray or an aerosol. To prevent breeding, pay special attention to moist and rotting straw, hay, lawn clippings, and other decaying vegetation. Where possible burn these materials, or spread them thinly in the sun to dry; or spray them with 0.5 per cent DDT emulsion.

LITTLE HOUSE FLY, LATRINE FLY, AND FALSE STABLE FLY

The little house fly[3] is a smaller, more slender fly than the house fly, from which it may be distinguished by its having only three dark longitudinal stripes on the thorax; and by its having a narrow, tapering abdomen, the basal segments of which are partially translucent. It occurs throughout the summer, but appears to be most numerous in the spring and fall. Its flat, spiny maggots may be found in manure, human feces, and other decaying organic matter.

The latrine fly[4] is closely related to the lesser house fly, which it greatly resembles in appearance and life-history. It is called the latrine fly because of its habit of breeding in human excrement.

The false stable fly[5] is often found in dwellings and is commonly mistaken for the house fly, which it closely resembles, but it is larger. The species breeds in manure and various kinds of decomposing organic matter.

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[2] *Stomoxys calcitrans* (L.).

[3] *Fannia canicularis* (L.).

[4] *Fannia scalaris* (F.).

[5] *Muscina stabulans* (Fall.).

CONTROL

To control these species use the measures recommended against the house fly.

CLUSTER FLY

The cluster fly[6] is somewhat larger than the house fly and may be distinguished from it by its generally darker color, the absence of distinct stripes on the thorax, and the presence on its body of many short yellowish hairs. During the summer the flies live outdoors but in the fall they find their way into dwellings and other buildings, to hibernate. They gain entrance around window frames, under shingles, and through openings in walls and cracks in foundations and similar places; and then may cluster together in attics, in the walls, and in other secluded locations. During fall and spring and on warm days in the winter the flies may periodically become active indoors and fly clumsily at lights or bumble noisily at window panes. The larvae of the cluster fly develop as internal parasites of earthworms.

CONTROL

Because the larvae develop in earthworms it is practical to take action only against the adults. Tightly screen doors and windows, repair faults in construction, and stop up other openings through which the flies may enter. Spray a residual insecticide into the places in buildings where they hibernate, and spray or brush it on window frames and sashes. Use a space spray or aerosol to destroy flies active in the building.

BLOW FLIES

Blow flies are rather large, noisy, metallic blue or green insects, which deposit their eggs and develop in a variety of organic matter such as fresh and decaying meat, fish, garbage, and human feces. They also lay eggs in wounds and sores in living animals and man, their larvae developing therein and causing a condition known as myiasis.

Owing to their habit of frequenting feces, diseased and decaying meat, other filth, wounds, and sores, blow flies may transmit disease. They frequently enter dwellings in search of food and shelter during the spring and summer months, and deposit their eggs on exposed meat. There are a number of species of these flies in Canada. Common species are blue-bottle[7] and green-bottle[8] flies. The former are about half an inch long and have a bluish-black thorax and dark metallic blue abdomen; the latter are slightly larger than the house fly and of a metallic bluish-green color.

CONTROL

Dispose of carcasses and offal by burial or incineration. Prevent the flies from having access to human feces in such places as open privies by treating the feces with powdered borax and covering with soil. Do not allow decaying organic matter to accumulate in such places as municipal dumps, but dispose of it by burning. Protect open wounds and sores from flies. Do not expose meat where the flies may deposit their eggs on it. Use screens on doors and windows. Destroy flies that gain entrance to buildings with a space spray or aerosol. Residual insecticides applied inside buildings as used for the house fly are not very effective against blow flies because of their different habits. In places where blow flies are abundant, such as about abbatoirs, find the night-resting places of the flies, which may be outdoors on the walls of buildings and on nearby vegetation, and spray these with a five per cent emulsion or suspension of DDT.

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[6] *Pollenia rudis* (F.).

[7] *Calliphora vomitoria* (L.).

[8] *Lucilia caesar* (L.) and *Pharnicia sericata* (Mg.).

FRUIT FLIES

Small, light reddish-brown flies may often be seen flying in numbers about ripe and fermenting fruit. These are fruit flies of the genus *Drosophila*. A common species[9] is barely an eighth of an inch long. Fruit flies lay their eggs and breed in fruit, pickle mustard, and fermenting liquids such as vinegar, wine, and cider; and their small, slender, white larvae may sometimes be found in large numbers in canned fruit and vegetables and jars of pickles left open or imperfectly sealed.

Owing to their small size it is difficult to exclude fruit flies from buildings with ordinary fly-screens. They may also be introduced in infested fruit and vegetables. They reproduce rapidly, the entire life-cycle from egg to winged fly taking less than two weeks.

CONTROL

Good sanitation is important. Keep premises thoroughly clean. Remove and destroy overripe and fermenting fruits and vegetable materials and garbage in which the flies breed. After opening containers of preserved fruits and vegetables or liquids that may ferment, keep them in a refrigerator. Destroy the adult flies with a space spray or an aerosol.

INSECTICIDES AND THEIR USE IN FLY CONTROL

Various insecticides[10] are used in fly control. They may be generally classified as space sprays, aerosols, and residual sprays.

SPACE SPRAYS

These usually contain pyrethrins and an activator such as piperonyl butoxide (Pyrenone) or an organic thiocyanate (e.g., Lethane, Thanite) in deodorized kerosene. They may also contain 0.5 per cent of DDT or 0.05 per cent of lindane. These sprays are intended for use as ordinary fly sprays to kill flies on the wing, and are not expected to give a prolonged residual effect. They are most effective in closed rooms. Apply them with a good hand or electric sprayer that atomizes the spray into the air as a fine mist.

AEROSOLS

Liquefied gas aerosols are sold in metal containers popularly known as aerosol "bombs". They usually contain two or three per cent of DDT or methoxychlor, or up to 0.2 per cent of lindane, plus pyrethrins and piperonyl butoxide, a solvent, and Freon as the propellent; or the active ingredients may consist of only pyrethrins and an activator. When the valve at the top of the "bomb" is opened, a foglike mist is emitted and dispersed through the air by the Freon gas. Aerosols are very effective against flies indoors. They may also be produced with various mechanical and thermal atomizers. The latter include lindane vaporizers that are electrically operated and thermostatically controlled to vaporize not more than one gram of lindane per 15,000 cubic feet in 24 hours. These should be used only in premises where humans are exposed to the lindane vapor for not more than eight hours in 24.

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[9] *Drosophila melanogaster* Mg.

[10] Insecticides offered for sale in Canada have to be registered in accordance with the provisions of the Pest Control Products Act. Under the regulations of this act the ingredients, guarantee, purpose of the product, directions for use, and labels are reviewed by the Department of Agriculture before applications for registration are accepted. Hence, proprietary preparations may be purchased and used with confidence if the directions of the manufacturer or vendor are followed.

RESIDUAL SPRAYS

These sprays are intended for application as a wet mist to surfaces on which it is desired to leave a deposit of the insecticide that will continue to kill insects over a prolonged period. They may contain five per cent of DDT, methoxychlor, or toxaphene, or two per cent of chlordane, or 0.5 per cent of lindane. The usual recommended dosage is one gallon to 1,200 square feet of surface, applied as a wet mist with a compressed air sprayer or merely with a brush. Proprietary residual sprays for use in dwellings usually contain DDT, chlordane, or lindane, in deodorized kerosene, and sometimes a small percentage of another insecticide such as pyrethrins and an activator, or organic thiocyanates such as Lethane, to increase the initial speed of "knock-down". These insecticides and methoxychlor and toxaphene may also be purchased as emulsifiable concentrates or wettable powders; mix these preparations with water to the required dilution before use. Emulsions and wettable powders (suspensions) are commonly used in farm buildings and similar places. However, only methoxychlor and lindane should be used in dairy barns.

Unfortunately, in many areas the house fly has developed a high degree of resistance to DDT and probably also to other chlorinated hydrocarbons, including methoxychlor, lindane, chlordane, and toxaphene. However, other species of flies included in this publication are not resistant to these insecticides.

New organic phosphate compounds are being developed that are effective against resistant house flies. One of the safest of these, malathion, has been approved for use in Canada. It is available as a 50 per cent emulsifiable concentrate and a 25 per cent wettable powder. These are mixed with water to give a concentration of one per cent malathion for application as a residual spray at the rate of one gallon to 1,000 square feet on painted surfaces and two gallons on unpainted surfaces. The residue may remain effective for about two weeks. A small amount of sugar, syrup, or molasses added as a fly attractant is reported to prolong the insecticidal effect. Malathion may be used in buildings housing animals, including dairy barns, and in similar structures, but at the time of writing is not recommended for use in dwellings. Remove all animals and poultry before spraying and avoid contamination of foodstuffs. It may also be sprayed on and about manure and other fly-breeding substances to kill the larvae and also the adult flies attracted to such places.

For further information write to the Veterinary and Medical Entomology Unit, Science Service Building, Ottawa.

(Where brand names are used in this publication it is because chemical names for the materials are difficult for general use and there are no official common names for them.)

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